

AN IMPROVED STATIC ELECTRIC MACHINE.

Our illustrations show the general appearance of a static electric machine that has been perfected by Mr. Henry B. Todd, of Meriden, Conn., and that will be found most useful by physicians and others who need a reliable machine for giving electrical treatment and for X-ray work. The machine is an improvement over the Holtz or Toepler style of machine, both in details of construction and in immunity from being affected by damp weather. It is absolutely self-exciting, requiring no separate exciter or starter, and can be depended on for practically the same current under all weather conditions.

With all other static machines now on the market, the use of chloride of calcium or some other moisture absorbent is obligatory during damp weather, especially the dog-day weather of July and August.

Two seasons' use of the Todd machine on the New England coast during these humid summer months has demonstrated this to be unnecessary, the moisture-defying qualities of the machine, as well as its increased powerfulness, seeming to be due to the novel form of construction, upon which Mr. Todd has secured a patent.

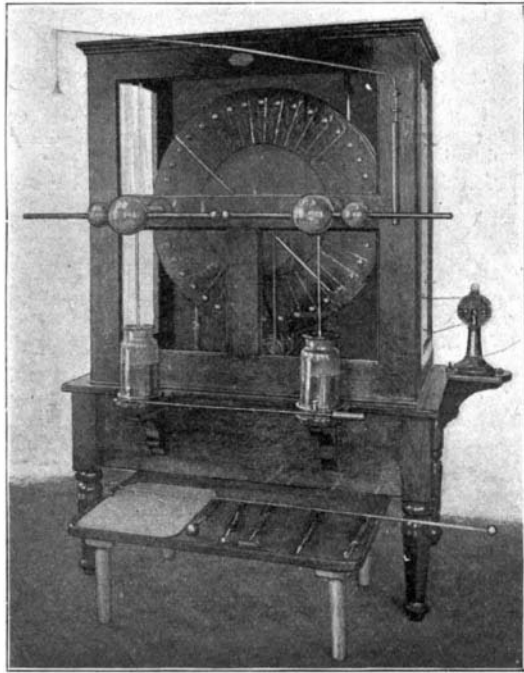
The new form of construction used consists in making all the plates revolve, and in placing alongside of each plate having sectors, a plain plate that revolves with it. In the machine shown, for example, the two outside plates each have sectors, or raised buttons, for the exciting brushes to rub against. These two plates revolve in opposite directions, while the inside plain plate adjoining each revolves with it. By the addition of the plain plates, the capacity of the machine in current it will deliver is increased fourfold. This current is collected from the plates in the regular way by combs within the casing and in close proximity to them, the combs being on rods that pass through heavy hard rubber insulating bushings and join the two main rods carrying the balls in front.

Leyden jars are connected to these rods in the usual manner.

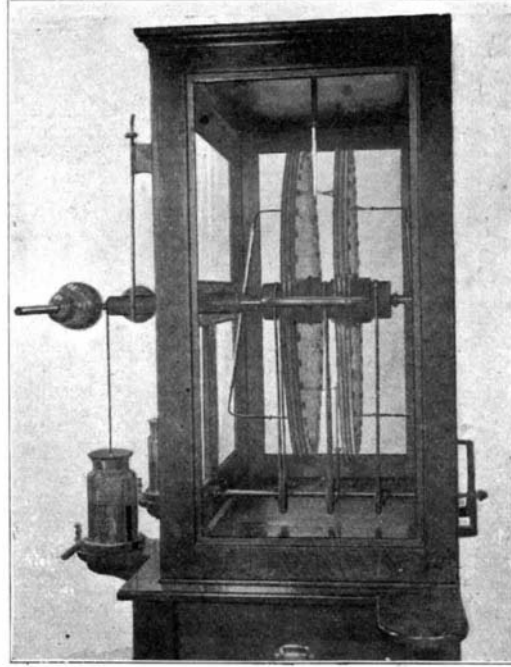
The Todd machine is very substantially built and has several improvements in construction, such as the method of clamping the plates without danger of breaking or loosening after they are once adjusted; the attaching of the conductors to the combs by friction, so that accidental displacement of the sliding electrodes can be instantly adjusted; and the perfecting of all minor details that is so essential to thorough efficiency.

By revolving both plates in opposite directions, the surface speed is practically doubled, so that all the advantages claimed for fast speed in X-ray work are secured, while at the same time both the wear and vibration of the high speeds ordinarily employed are reduced one half, thus conducing to long life of the machine and its compara-

tively noiseless operation. The machines can be run by a small electric or water motor, or by hand power. They are manufactured by the Electric Manufacturing Company, of Meriden, Conn., and are made in a variety of sizes suitable for physicians, hospitals, sanitariums, and family use.

FRENCH COMMERCE-DESTROYER "GUICHEN."
The French naval architects have earned a great

Front View, Showing Leyden Jars, Electrical Message Instruments on Table, and Motor for Driving at the Side.



Side View, Showing Four Pairs of Plates with Their Exciting Brushes.

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reputation by the almost uniform success which has marked the speed trials of the fast cruisers and commerce destroyers designed during the past decade for the French navy. There is no body of naval architects that has gone so deeply into the theoretical side of the question of ship models and propeller designs in relation to high speed, and in the past four or five years particularly they have succeeded in obtaining, almost without exception, higher speeds in their cruisers and commerce-destroyers than were called for by the contract. The accompanying illustration is from a photograph of the fast commerce-destroyer "Guichen," which on her trial developed a maximum speed of 23.55 knots per hour. The vessel has those well-defined characteristics of the French cruisers by which they can be recognized at first glance and distinguished from those of any other navy, the most conspicuous

difference being the extreme tumble-home of the topsides, which, instead of extending vertically from the waterline to the upper deck, as in our own vessels, curves sharply inboard from the waterline, and then rounds up to the level of the upper deck with a reverse curve. This form has the advantage of reducing top weights and the disadvantage of greatly reducing the berthing accommodations for the ship's crew. In only one vessel, the "Brooklyn," has our Navy Department

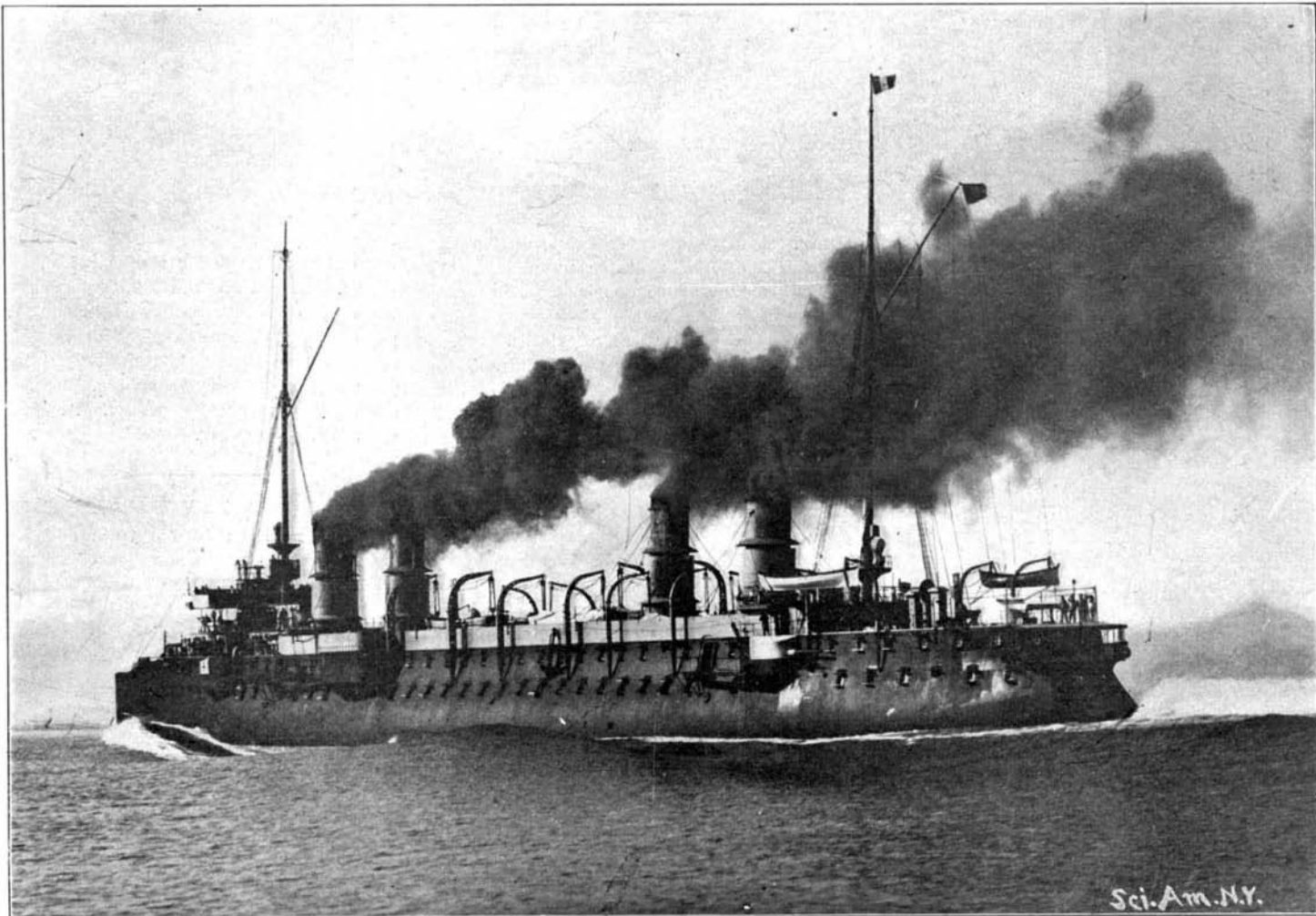
shown any disposition to imitate the French practice, and while the latter is a very successful ship and popular with the navy, it is not likely that we shall build another of her peculiar above-water form.

The "Guichen" has a length of 463 feet, a beam of 55 feet, and a draft of 27 feet. It will thus be seen that for a cruiser she is narrow in proportion to her length, and to this is to be attributed in some degree her remarkable speed. She is driven by three sets of four-cylinder, triple-expansion engines, one to each of the three propellers. Her boiler plant consists of thirty-six Lagrafel d'Allest boilers. The designed indicated horse power under natural draft was 14,500; and the designed full power was 24,000 horse power. On her trial, however, during a run under natural draft of twenty-four hours' duration, she indicated 18,500 horse power, and maintained an average speed of twenty knots an hour; and on a four hours' continuous trial under forced draft she indicated

25,455 horse power, which gave her a speed of 23.55 knots an hour. As the vessel was designed primarily as a commerce-destroyer, her armament is a light one relatively to her displacement. She carries two 45-caliber 6.4 inch rapid-fire guns on the upper deck, one forward and one aft, protected by gun shields. On the deck below she carries six 5.5 inch rapid-fire guns, which are mounted in casemates of 1½-inch armor. These are mounted one on either bow, one on either quarter, and one on each beam amidships. There are also ten 3-pounders, five 1-pounders, and two above-water torpedo tubes. The conning tower is protected with 6¼-inch armor, and the water-line protection consists of an armored deck 2½ inches in thickness which slopes from below the water-line at the sides to about 4½ feet above the water-line inboard. The deck also slopes forward and

aft to the bow and stern. With this armored deck is associated a belt of cellulose worked along the sides of the ship at the water-line.

The day on which the high-speed trials of the "Guichen" took place the sea was perfectly calm and afforded an excellent opportunity to study the wave action of a vessel of this kind traveling at high speed. The photograph reproduced is particularly interesting as showing this wave action and illustrating the remarkable wake produced when three propellers are exerting, as in this case, a thrust of over 25,000 horse power.



Displacement, 8,277 tons. Speed, 23.5k knots. Coal Supply, 2,000 tons and liquid fuel. Armor: 2½-inch deck; 1½-inch casemates; 2-inch gun shields. Armament: Two 6.4-inch; six 5.5-inch; ten 3-pounders; five 1-pounders; two above-water torpedo tubes. Complement, 625.

FAST FRENCH COMMERCE-DESTROYER "GUICHEN."